

## **II. CLAIMS**

1. (Previously presented) A method of encoding speech comprising the steps of:
  - formulating a speech signal from utterances spoken by a speaker;
  - determining an estimate of periodicity from the formulated signal by estimating pitch pulse locations from the formulated signal;
  - modifying the formulated signal using the periodicity estimate such that the pitch pulses are spaced substantially equally along a time axis and thus, changing pitch periods of the formulated signal and improving periodicity;
  - determining at least one voicing parameter based on the modified signal, the voicing parameter being either voiced or unvoiced;
  - deciding the encoding method based on at least one determined voicing parameter;
  - and
  - encoding the modified signal in a speech encoder.
2. (Original) A method according to claim 1 wherein the formulated speech signal is a digitized signal such as a residual signal produced from a coding algorithm such as Linear Predictive Coding (LPC) for the actual speech signal itself.
3. (Original) A method according to claim 1 wherein the determining an estimate of periodicity step comprises obtaining a normalized pitch cycle by autocorrelation.
4. (Original) A method according to claim 3 wherein the modifying step include normalizing the pitch by shifting the time domain discrete values of the residual signal to conform to the normalized pitch cycle.

5. (Original) A method according to claim 4 wherein the modifying step further comprises the speech signal being upsampled by interpolation such that suitable discrete values of the upsampled signal are shifted to conform to the average pitch cycle.

6. (Original) A method according to claim 1 wherein a pitch scaling algorithm such as Time Domain Pitch Synchronous Overlap-Add (TD-PSOLA) is used to normalize the pitch cycle lengths in an analysis frame.

7. (Original) A method according to claim 5 wherein the modified signal is down sampled prior to encoding in the speech coder.

8. (Previously presented) An apparatus for generating a modified signal suitable for use with a speech encoder/decoder comprising:

means for formulating a speech signal from utterances spoken by a speaker;

means for determining an estimate of periodicity from the formulated signal by estimating pitch pulse locations from the formulated signal;

means for modifying the formulated signal using the periodicity estimate such that the pitch pulses are spaced substantially equally along a time axis and thus, changing pitch periods of the formulated signal and improving periodicity;

means for determining at least one voicing parameter based on the modified signal, the voicing parameter being either voiced or unvoiced;

means for deciding the encoding method based on at least one determined voicing parameter; and

means for encoding the modified signal in the speech encoder/decoder.

9. (Original) An apparatus according to claim 8 wherein the formulating means includes software operating with a signal processor that is capable of generating a residual signal from a speech signal.

10. (Original) An apparatus according to claim 8 wherein the apparatus includes a memory comprising a software operating with a signal processor for providing means for transforming, estimating, and modifying the speech signal.

11. (Original) An apparatus according to claim 8 wherein the apparatus is integrated into a mobile device.

12. (Previously presented) A mobile device comprising:

a speech coder;

means for formulating a speech signal from utterances spoken by a speaker;

means for determining an estimate of periodicity from the formulated signal by estimating pitch pulse locations from the formulated signal;

means for modifying the formulated signal using the periodicity estimate such that the pitch pulses are spaced substantially equally along a time axis and thus, changing pitch periods of the formulated signal and improving periodicity;

means for determining at least one voicing parameter based on the modified signal, the voicing parameter being either voiced or unvoiced;

means for deciding the encoding method based on at least one determined voicing parameter; and

means for encoding the modified signal in the speech coder.

13. (Original) A mobile device according to claim 12 wherein the formulating means includes software operating with a signal processor that is capable of generating a residual signal from a speech signal.

14. (Original) A mobile device according to claim 12 wherein the mobile device includes a memory comprising a software operating with a signal processor for providing means for transforming, estimating, and modifying the speech signal.

15. (Previously presented) A network element comprising:

means for formulating a speech signal from utterances spoken by a speaker;

means for determining an estimate of periodicity from the formulated signal by estimating pitch pulse locations from the formulated signal;

means for modifying the formulated signal using the periodicity estimate such that the pitch pulses are spaced substantially equally along a time axis and thus, changing pitch periods of the formulated signal and improving periodicity;

means for determining at least one voicing parameter based on the modified signal, the voicing parameter being either voiced or unvoiced;

means for deciding the encoding method based on at least one determined voicing parameter; and

means for encoding and decoding speech signals using the modified signal.

16. (Original) A network element according to claim 15 integrated into a radio base station functioning within a wireless telecommunication network.

17. (Original) A network element according to claim 15 wherein the formulating means includes software operating with a signal processor that is capable of generating a residual signal from a speech signal.

18. (Original) A network element according to claim 15 wherein the mobile device includes a memory comprising a software operating with a signal processor for providing means for transforming, estimating, and modifying the speech signal.